

F - BASIC TESTING

1991 Mitsubishi Montero

1991 ENGINE PERFORMANCE
Basic Diagnostic Procedures

Chrysler; Colt, Colt 200, Colt Vista, Ram-50, Stealth,
Summit
Mitsubishi; Eclipse, Galant, Mirage, Montero, Pickup, 3000GT

INTRODUCTION

The following diagnostic steps will help prevent overlooking a simple problem. This is also where to begin diagnosis for a no start condition. First step in diagnosing any driveability problem is verifying customer's complaint with a test drive under conditions problem reportedly occurred.

Before entering self-diagnostics, perform a careful and complete visual inspection. Most engine control problems result from mechanical breakdowns, poor electrical connections or damaged/misrouted vacuum hoses. Before condemning computerized system, perform each test listed in article.

NOTE: Perform all voltage tests with a Digital Volt-Ohmmeter (DVOM) with a minimum 10-megohm input impedance, unless stated otherwise in test procedure.

PRELIMINARY INSPECTION & ADJUSTMENTS

VISUAL INSPECTION

Visually inspect all electrical wiring, looking for chafed, stretched, cut or pinched wiring. Ensure electrical connectors fit tightly and are not corroded. Ensure distributor cap and rotor are free of cracks, carbon trails or contamination. Ensure vacuum hoses are properly routed and not pinched or cut. See M - VACUUM DIAGRAMS article in the ENGINE PERFORMANCE Section to verify routing and connections (if necessary). Inspect air induction system for possible vacuum leaks.

MECHANICAL INSPECTION

Compression

Check engine mechanical condition with a compression gauge, vacuum gauge, or an engine analyzer. See engine analyzer manual for specific instructions.

WARNING: DO NOT use ignition switch during compression tests. Use a remote starter to crank engine. Fuel injectors on many models are triggered by ignition switch during cranking mode, which can create a fire hazard or contaminate engine's oiling system.

COMPRESSION SPECIFICATIONS TABLE (1)

Application	Specification psi (kg/cm ²)
1.5L (VIN X)	137 (9.6)
1.6L (VIN Y)	171 (12.0)
1.8L (VIN T)	131 (9.2)

2.0L (VIN R) DOHC	137 (9.6)
2.0L (VIN U) DOHC Turbo	114 (8.0)
2.0L (VIN V) SOHC	119 (8.4)
2.4L (VIN W) SOHC	119 (8.4)
3.0L (VIN S) SOHC	119 (8.4)
3.0L (VIN B) DOHC	139 (9.8)
3.0L (VIN C) DOHC Turbo	115 (8.1)

(1) - Maximum variation between cylinders 14 psi
(1.0 kg/cm²)

Exhaust System Backpressure

Exhaust system can be checked with a vacuum or pressure gauge. Remove O2 sensor or air injection check valve (if equipped). Connect a 1-10 psi pressure gauge and run engine at 2500 RPM. If exhaust system backpressure is greater than 1 3/4-2 psi, exhaust system or catalytic converter is plugged. If a vacuum gauge is used, connect vacuum gauge hose to intake manifold vacuum port and start engine. Observe vacuum gauge. Open throttle part way and hold steady. If vacuum gauge reading slowly drops after stabilizing, exhaust system should be checked for a restriction.

FUEL PRESSURE

Basic diagnosis of fuel system should begin with determining fuel system pressure.

FUEL INJECTED ENGINES

WARNING: ALWAYS relieve fuel pressure before disconnecting any fuel injection-related component. DO NOT allow fuel to contact engine or electrical components.

Fuel Pressure

1) On all models except Colt and Mirage, disconnect fuel pump harness connector at fuel tank. On Colt and Mirage, remove rear seat cushion to disconnect fuel pump harness connector.

2) On all models, start engine. Let engine run until it stops. Turn ignition off. Disconnect negative battery terminal. Connect fuel pump harness connector.

WARNING: Before disconnecting high pressure fuel hose at fuel delivery pipe, cover fuel hose connection with a rag. Some residual fuel pressure may still be in system.

3) On Galant 2.0L (DOHC), remove brace for access to high pressure fuel delivery pipe. On all engines, disconnect high pressure fuel hose at fuel delivery pipe.

4) Connect fuel pressure gauge with adapter between fuel delivery pipe and high pressure hose. See Fig. 1. Connect negative battery terminal. Connect battery voltage to fuel pump test terminal. See FUEL PUMP TEST TERMINAL LOCATION table. Ensure no fuel leaks are present. Disconnect battery voltage to fuel pump test terminal.

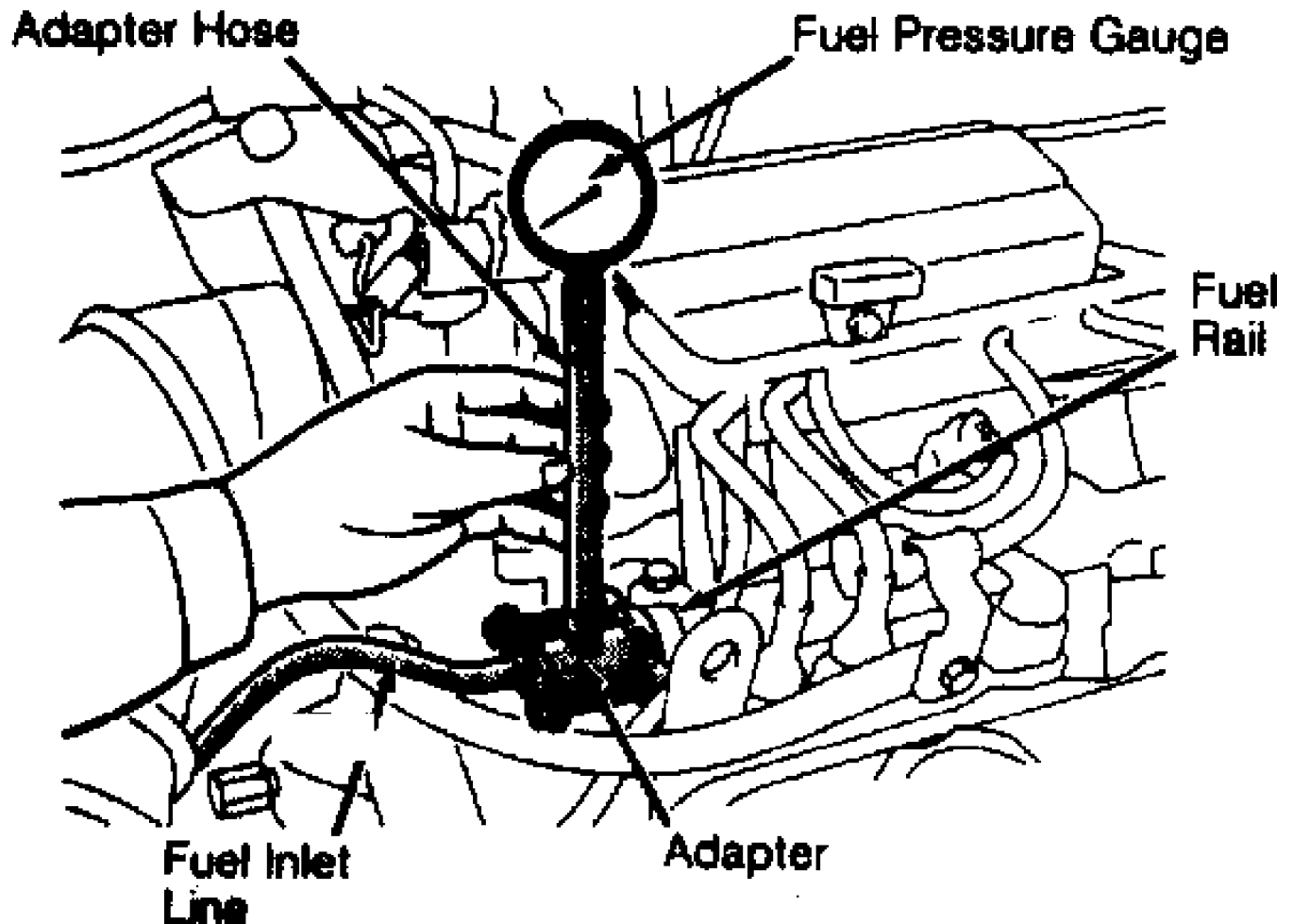


Fig. 1: Fuel Pressure Testing Connection ID (Typical Fuel Inj. Eng.)
 Courtesy of Mitsubishi Motor Sales of America.

5) Start engine and let idle. Measure fuel pressure with vacuum hose connected to fuel pressure regulator. Record fuel pressure reading. Disconnect and plug vacuum hose from fuel pressure regulator. Record fuel pressure reading. See REGULATED FUEL PRESSURE table.

6) Check for fuel pressure in fuel return hose by gently pinching hose while increasing engine speed. If fuel volume is low, fuel pressure in return hose will not be felt. Increase engine speed to 2500-3000 RPM, 2-3 times. Return engine to idle. Fuel pressure should not drop when engine is returned to idle.

7) Turn engine off. Ensure fuel pressure reading does not decrease within 2 minutes. If a decrease is noted, monitor speed of decrease.

8) If fuel pressure is lower than specification, fuel pressure drops at idle after increasing engine speed to 2500-3000 RPM, or no fuel pressure in fuel return hose can be felt, check for clogged fuel filter, faulty fuel pressure regulator, or fuel pump.

9) If fuel pressure is higher than specification, check for a faulty fuel pressure regulator or plugged fuel return line. If fuel pressure does not change when vacuum hose to regulator is connected or disconnected, check for a leaking or clogged vacuum hose to fuel pressure regulator or faulty fuel pressure regulator.

10) If fuel pressure decreases suddenly after engine is stopped, check valve within fuel pump is not seated. Replace fuel

pump. If fuel pressure drops slowly, fuel injector is leaking or fuel pressure regulator valve seat is leaking. Check for faulty fuel injector or fuel pressure regulator. Repair as required.

11) When fuel pressure test is complete, repeat fuel pressure release procedure in steps 1) and 2) before disconnecting fuel pressure gauge. Install new "O" ring at end of high pressure hose. Check for fuel leaks.

FUEL PUMP TEST TERMINAL LOCATION TABLE

Application	Wire Color	Location
Colt, Colt 200	BLK/WHT	Center Of Firewall
Colt Vista	BLK/WHT	Right Center Of Firewall
Eclipse	BLK/WHT	Rear Of Battery Compt.
Galant	YEL/GRN	Left Rear Eng. Compt.
Mirage 1.5L	BLK/WHT	Center Of Firewall
Mirage 1.6L	BLK/BLU	Center Of Firewall
Montero	WHT	Right Center Of Firewall
Pickup	BLK/BLU	Right Side Of Eng. Compt.
Precis	YEL	Left Rear Eng. Compt.
Summit	BLK/WHT	Center Of Firewall
Ram-50	BLK/BLU	Right Side Of Eng. Compt.
Stealth, 3000GT	BLK/BLU	Rear Of Battery Compt.

REGULATED FUEL PRESSURE TABLE

Application	At Idle w/Vacuum psi (kg/cm ²)	At Idle w/o Vacuum psi (kg/cm ²)
Non-Turbo	38 (2.7)	47-50 (3.3-3.5)
Turbo		
Except Eclipse A/T	27 (1.9)	36-38 (2.5-2.7)
Eclipse A/T	33 (2.3)	36-38 (2.9-3.2)

Control Relay

Multipurpose relay switches power to vehicle sensors and actuators including airflow sensor, crank angle sensor, idle speed control, injectors and fuel pump. When ignition switch is turned to ON position, ECU energizes coils controlling injectors, airflow sensor and idle speed control. When ignition switch is turned to START position, ECU energizes coils (through inhibitor switch on A/T models) to supply power to fuel pump. Relay failure will cause a no-start condition. For testing procedure, see SYSTEM & COMPONENT TESTING article.

IGNITION CHECKS

SPARK

Check for spark at coil wire (if applicable) and at each spark plug wire using a high output spark tester. Check spark plug wire resistance on suspect wires. For wire resistance specification, see C - SPECIFICATIONS article in the ENGINE PERFORMANCE Section.

CRANK ANGLE SENSOR

For crank angle sensor testing procedure on all models except Ram-50, Stealth, Eclipse, Laser, Pickup and 3000GT, see TEST NS-5:

TESTING CRANK ANGLE SENSOR CIRCUIT - G - TESTS W/CODES article in the ENGINE PERFORMANCE section.

On Eclipse and Laser, see NS-4A: REPAIRING CRANK ANGLE SENSOR in G - TESTS W/CODES - 1.8L article.

On Ram-50, Stealth, Pickup and 3000GT testing information not available at time of publication.

DISTRIBUTORLESS IGNITION SYSTEM (DIS)

Ignition Coil Resistance (4-Cyl Vehicles Except Eclipse 2.0L)

1) Using a Digital Volt/Ohmmeter (DVOM), measure primary coil resistance between ignition coil connector terminals No. 2 and No. 3 (coils for cylinders No. 1 and No. 4) and terminals No. 1 and No. 3 (coils for cylinders No. 2 and No. 3). See Fig. 2.

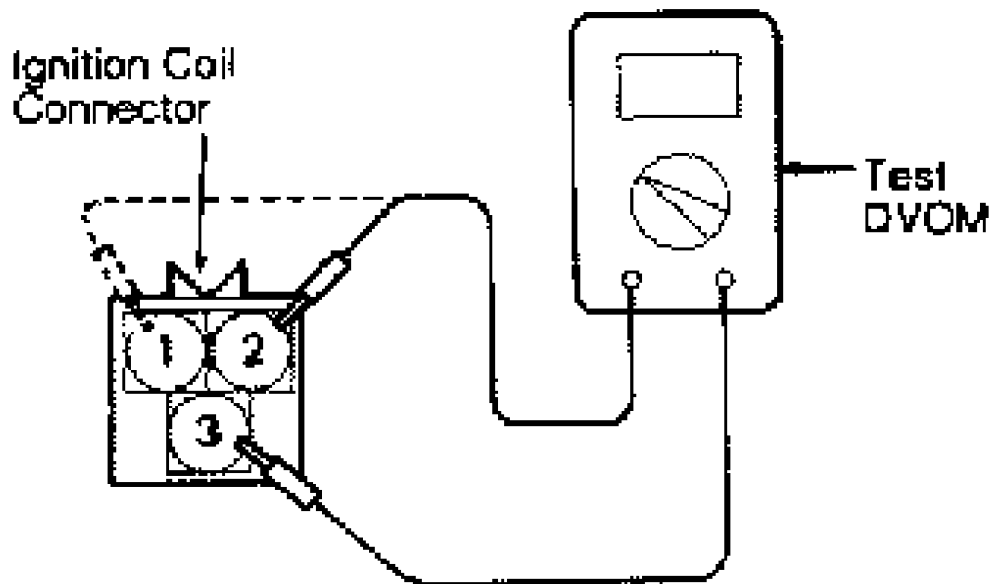


Fig. 2: Testing Ignition Coil Primary Resistance (4-Cylinder)
Courtesy of Mitsubishi Motor Sales of America.

2) Measure secondary coil resistance between coil towers for cylinders No. 1 and No. 4 and between coil towers for cylinders No. 2 and No. 3. See Fig. 3. Primary and secondary coil resistance should be within specification. See DIS IGNITION COIL RESISTANCE table.

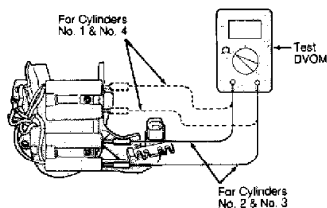


Fig. 3: Testing Ignition Coil Secondary Resistance (4-Cylinder)
Courtesy of Mitsubishi Motor Sales of America.

Ignition Coil Resistance (Eclipse 2.0L)

1) Using a DVOM, measure primary coil resistance between ignition coil connector terminals No. 2 and No. 4 (coils for cylinders No. 1 and No. 4) and between terminals No. 4 and No. 1 (coils for cylinders No. 2 and No. 3). See Fig. 2.

2) Measure secondary coil resistance between coil towers for cylinders No. 1 and No. 4 and between coil towers for cylinders No. 2 and No. 3. See Fig. 3. Primary and secondary coil resistance should be within specification. See DIS IGNITION COIL RESISTANCE table.

DIS IGNITION COIL RESISTANCE TABLE Ohms @ 68°F (20°C)

Application	Primary	Secondary
All Models .....	.77-.95	10.3-13.9

Power Transistor (Eclipse)

1) Disconnect power transistor connector. Using an analog ohmmeter, connect positive ohmmeter lead to terminal No. 7 and negative lead to terminal No. 3. See Fig. 4. Ensure there is no continuity.

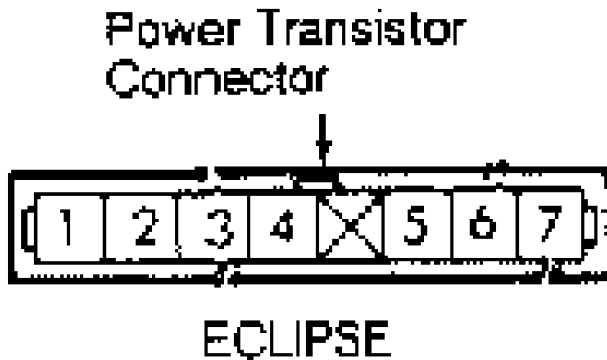


Fig. 4: Power Transistor Connector ID (Eclipse)
Courtesy of Mitsubishi Motor Sales of America.

2) Using a 1.5-volt dry cell battery, connect positive end of 1.5-volt battery to power transistor terminal No. 6 and negative end to terminal No. 3. Ohmmeter should now read continuity between power transistor terminals No. 7 and No. 3.

3) Connect positive end of 1.5-volt battery to power transistor terminal No. 2 and negative end to terminal No. 3. Connect positive ohmmeter lead to terminal No. 1 and negative lead to terminal No. 3. Ohmmeter should read continuity. Replace power transistor if it does not test as described.

Power Transistor (Colt Vista, Galant, Montero, Pickup & Ram-50)

1) Disconnect power transistor connectors. Using a DVOM, connect positive ohmmeter lead to terminal No. 2 and negative lead to terminal No. 3. See Fig. 5. Ensure there is no continuity.

2) Using a 1.5-volt dry cell battery, connect positive end of 1.5-volt battery to power transistor terminal No. 1 and negative end to terminal No. 2. DVOM should now read continuity at power transistor terminals No. 2 and No. 3. Replace power transistor if it does not test as described. See Fig. 6.

Power Transistor
Connector



COLT VISTA, GALANT
MONTERO, PRECIS,
P/U & RAM 50

Fig. 5: Power Trans Conn ID (Colt Vista, Galant, Montero, P/U & Ram 50)
Courtesy of Mitsubishi Motor Sales of America.

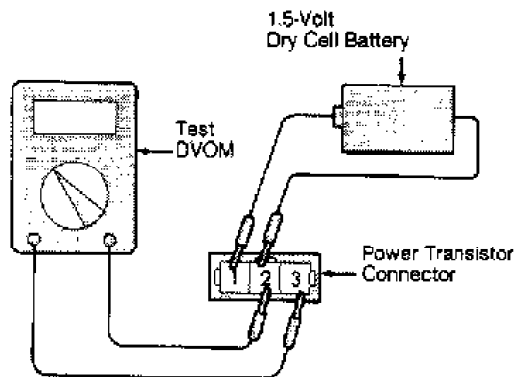


Fig. 6: Testing Power Trans (Colt Vista, Galant, Montero, Pickup & Ram-50)
Courtesy of Mitsubishi Motor Sales of America.

Power Transistor (Colt, Colt 200, Mirage & Summit)

1) Disconnect power transistor connectors. Using a DVOM, connect positive ohmmeter lead to terminal No. 2 and negative lead to terminal No. 7. See Fig. 7. Ensure there is no continuity.

2) Using a 1.5-volt dry cell battery, connect positive end of 1.5-volt battery to power transistor terminal No. 8 and negative end to terminal No. 7. DVOM should now read continuity at power transistor terminals No. 2 and No. 7. Replace power transistor if it does not test as described.



Fig. 7: Power Transistor Connector ID (Colt, Summit & Mirage)
Courtesy of Mitsubishi Motor Sales of America.

Power Transistor (Stealth & 3000GT)
When testing power transistor, refer to POWER TRANSISTOR
TESTING (STEALTH & 3000GT) table.



Fig. 8: Power Transistor Connector ID (Stealth & 3000GT)
Courtesy of Mitsubishi Motor Sales of America.

Cylinders Tested	(2) Analog Ohmmeter Connected Between Terminals (No 1.5 V Battery)		(2) With 1.5 V Battery Connected Between Terminals	
	1 & 4	3 & 7	No Continuity	6 & 7	Continuity
2 & 5	2 & 7	No Continuity	5 & 7	Continuity
3 & 6	1 & 7	No Continuity	4 & 7	Continuity

- (1) - All tests performed with power transistor disconnected. Replace power transistor if it does not test as described.
(2) - See Fig. 8 for terminal identification.

MAGNETIC & OPTICAL IGNITION

Ignition Coil Resistance

- 1) Using a DVOM, measure primary coil resistance between positive and negative terminals of coil. See Fig. 9. For ignition coil terminal identification See Fig. 11 - 13.
- 2) Measure secondary coil resistance between coil positive terminal and ignition coil tower. See Fig. 10.
- 3) Primary and secondary coil resistance should be within specification. See IGNITION COIL RESISTANCE table.

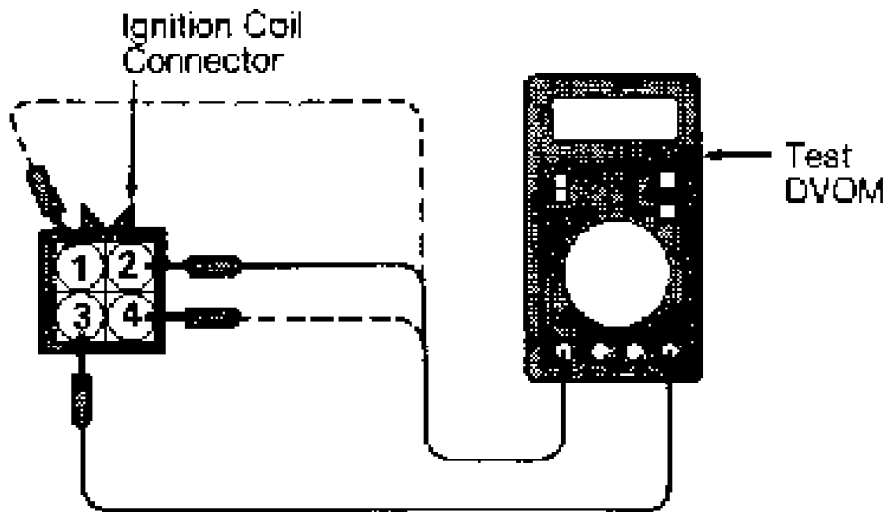
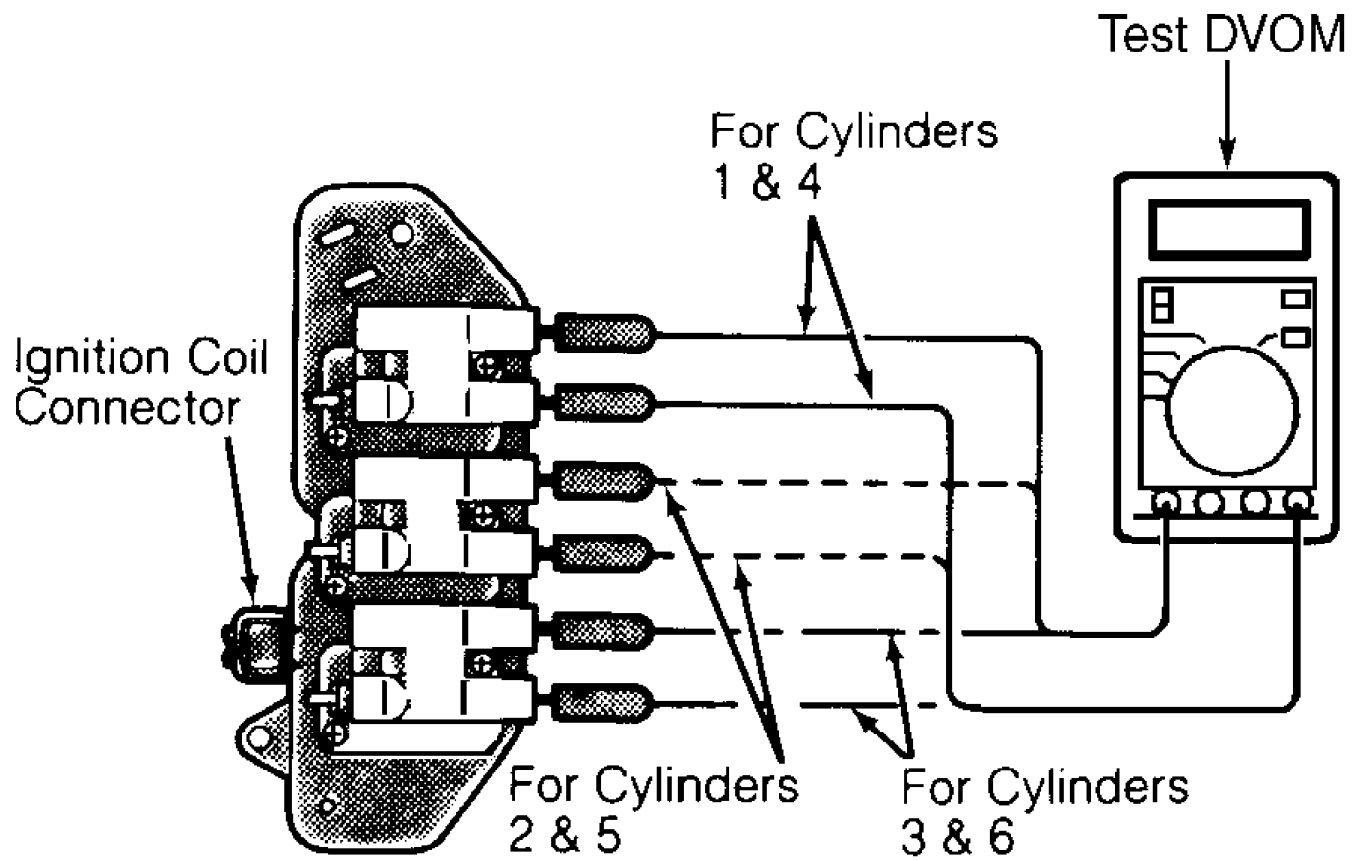
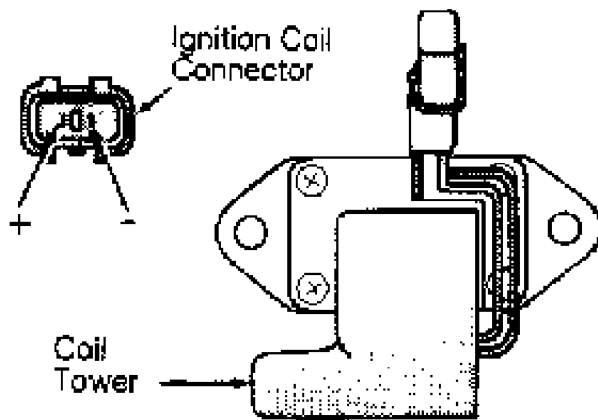


Fig. 9: Testing Ignition Coil Primary Resistance (6-Cylinder)
Courtesy of Mitsubishi Motor Sales of America.



91G16457

Fig. 10: Testing Ignition Coil Secondary Resistance (6-Cylinder)
 Courtesy of Mitsubishi Motor Sales of America.



COLT, COLT WAGON, COLT 200, ECLIPSE, MIRAGE 1.5L,
 PICKUP 2.4L, PRECIS & RAM-50 2.4L

Fig. 11: Ign Coil Term ID (Colt, Eclipse, Mirage 1.5L, P/U & Ram 50 2.4L)
 Courtesy of Mitsubishi Motor Sales of America.

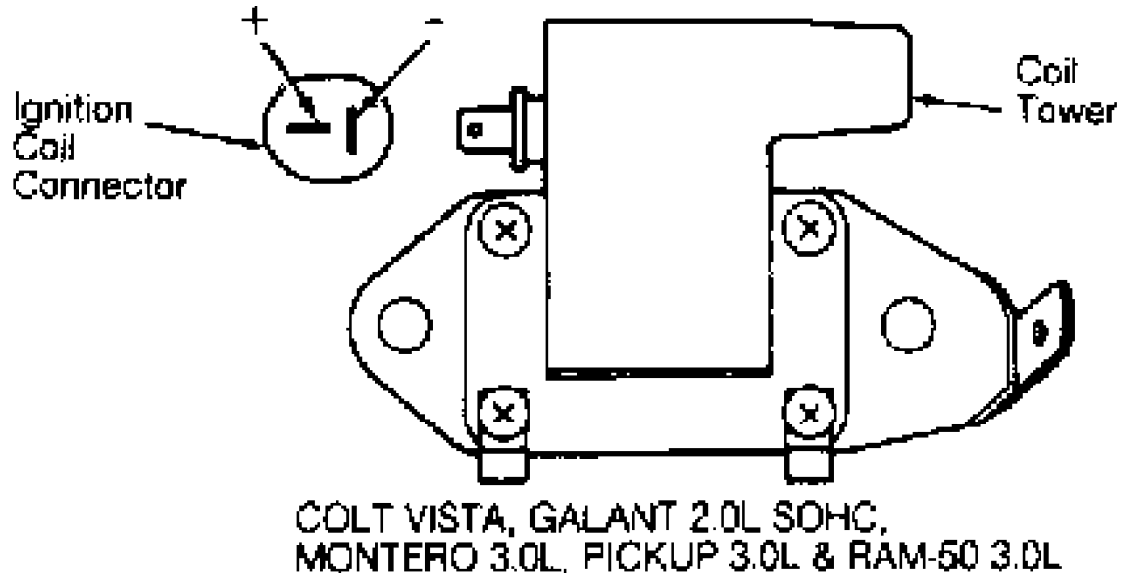


Fig. 12: Ign Coil Term ID (Colt Vista, Galant 2.0L SOHC & Montero, P/U & Ram 50 3.0L)
Courtesy of Mitsubishi Motor Sales of America.

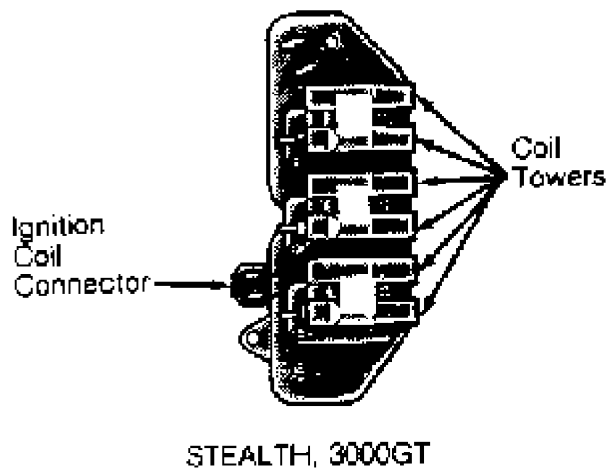


Fig. 13: Ignition Coil Terminal ID (Stealth & 3000GT)
Courtesy of Mitsubishi Motor Sales of America.

IGNITION COIL RESISTANCE TABLE - Ohms @ 68°F (20°C)

Application	Primary	Secondary
1.5L (VIN A) .....	.9-1.2	20,000-29,000
1.8L (VIN T)		
Except Eclipse .....	.72-.88	10,300-13,900
Eclipse .....	.90-1.2	19,000-27,000
2.0L (VIN V) .....	.72-.88	10,800-13,200
2.4L (VIN W) .....	.72-.88	10,300-13,900
3.0L (VIN B & C) .....	.67-.81	11,300-15,300
3.0L (VIN S) .....	.72-.88	10,300-13,900

IGNITION TIMING

IGNITION TIMING TABLE (Degrees BTDC @ RPM)

Application	(1) Basic	(2) (3) Actual
1.5L		
Colt, Colt		
200 & Mirage	5 @ 600-800	10 @ 600-800
Colt Vista	5 @ 600-800	15 @ 600-800
1.6L		
Colt, Colt 200		
Mirage & Summit	5 @ 650-850	8 @ 650-850
1.8L		
Colt Vista	5 @ 600-800	15 @ 600-800
Eclipse	5 @ 600-800	10 @ 600-800
2.0L		
Colt Vista		
& Galant (VIN V)	5 @ 650-850	12 @ 650-850
Eclipse	5 @ 650-850	8 @ 650-850
Galant (VIN R)	5 @ 650-850	8 @ 650-850
2.4L		
Pickup, Ram-50	5 @ 650-850	8 @ 650-850
3.0L		
Montero,		
Stealth & 3000GT	5 @ 600-800	15 @ 600-800
Pickup & Ram-50	8 @ 600-800	15 @ 600-800

- (1) - With ignition timing adjustment connector grounded or vacuum hose (farthest from distributor) disconnected.
- (2) - With ignition timing adjustment connector ungrounded or vacuum hose (farthest from distributor) connected. Ignition timing may fluctuate.
- (3) - If vehicle altitude is more than 2300 ft. above sea level, actual timing may be advanced.

SUMMARY

If no faults were found while performing F - BASIC TESTING, proceed to G - TESTS W/ CODES article in the ENGINE PERFORMANCE Section. If no hard codes are found in self-diagnostics, proceed to H - TESTS W/O CODES article in the ENGINE PERFORMANCE Section for diagnosis by symptom (i.e., ROUGH IDLE, NO-START, etc.), or intermittent diagnostic procedures.